भारतीय मानक
Indian Standard

IS 8485 : 2018
(Reaffirmed 2022)

चूर्ण धातुकर्मी अनुप्रयोगों के लिए तांबा चूर्ण

(पहला पुनरीक्षण)

Copper Powder for Powder Metallurgical Applications

(First Revision)

ICS No. 77.160

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July 2018 **Price Group 1**

Powder Metallurgical Materials and Products Sectional Committee, MTD 25

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Powder Metallurgical Materials and Products Sectional Committee had been approved by the Metallurgical Engineering Division Council.

The standard was first published in 1977. In this revision following modifications have been made:

a) Four new clauses ‘References’, ‘Terminology’, ‘BIS certification marking’ and ‘Test certificate’ have been added; and
b) Clauses ‘Grades’ and ‘Marking’ have been modified.

In the powder metallurgy industry copper powder is used for the manufacture of sintered bearings and parts, copper-graphite brushes and high-density electrical contacts. The requisites powder may be produced by a number of methods like gaseous reduction of copper oxide, electrolysis and atomization. The physical properties and chemical characteristics of the powder differ widely depending on the method of manufacture.

For the purpose of deciding whether a particular requirements of this standard is complied with, the final value, observed or calculated expressing the results of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 ‘Rules for rounding off numerical values (*revised*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

COPPER POWDER FOR POWDER METALLURGICAL APPLICATIONS

(First Revision)

1 SCOPE

1.1 This standard covers the requirements for copper powder for use in the powder metallurgical application.

2 REFERENCES

2.1 The following standards contain provisions, which through reference in this text, constitute provisions of this standard. At the same time of the publication, the editions indicated were valid. All the standards are subject to revision, and parties to agreement based on this standard are encouraged to investigate the possibility applying the most recent editions of the standard.

IS No.	*Title*
1387 : 1993	General requirements for the supply of metallurgical materials (*second revision*)
4840 : 1984	Method for determination of flaw rate of metal powders for powder metallurgical purposes (*first revision*)
4848 : 1981	Method for determination of apparent density of free flowing powders for powder metallurgical purposes (*first revision*)
4857 : 2005/ ISO 3927 : 2001	Metallic powders excluding powders for hardmetals — Determination of compressibility in uniaxial compression (*fourth revision*)
5432 : 1982	Glossary of terms relating to powder metallurgy (*first revision*)
5461 : 1984	Method for sieve analysis of metal powders (*first revision*)
5644 (Part 2) : 1993/ ISO 4491-2 : 1989	Metallic powder : Part 2 Loss of mass on hydrogen reduction (hydrogenloss) (*third revision*)
6492 : 1972	Method for sampling of powder for powder metallurgical purpose
7438 : 1974	Method for test for acid insoluble content in iron, copper, tin and bronze powders (*first revision*)

3 TERMINOLOGY

3.1 For the purpose of this standard, the definition of terms given in IS 5432 shall apply.

4 SUPPLY OF MATERIAL

4.1 General requirement relating to the supply of copper powder shall be as laid down in IS 1387.

5 GRADES

5.1 The material shall be of two grades, namely Grade 1 and Grade 2. The manufacturer shall specify the method of production of copper powder.

6 CHEMICAL COMPOSITION

6.1 The chemical composition of both the grades shall be given in Table 1.

Table Chemical Composition
(*Clause* 6.1)

	Percent
Copper	98.5, *Min*
Hydrogen loss	0.4, *Max*
Acid insolubles	0.3, *Max*
Others by differences	0.8, *Max*

6.1.1 The copper shall be determined as per the procedure given in Annex A.

6.1.2 The hydrogen loss shall be determined in accordance with IS 5644 (Part 2).

6.1.3 The acid insolubles shall be determined in accordance with IS 7438.

7 SIEVE ANALYSIS

7.1 The sieve analysis of the material shall be carried out in accordance with IS 5461 and shall be as given below; for size –150 and + 45 microns shall be as agreed to between the purchaser and the manufacturer:

Sieve Size Micron	*Percent of Powder, Max*	
	Grade 1	Grade 2
+180	Nil	Nil
+150	5	5
–45	15-35	35-55

8 PHYSICAL PROPERTIES

8.1 The apparent density of both the grades powder when tested in accordance with IS 4848 shall be between 2.5 and 3.0 g/cm^3. Any apparent density requirement outside this range shall be specifically agreed to between the purchaser and the manufacturer.

8.2 Flow Rate

8.2.1 The flow rate of the powder shall tested in accordance with IS 4840. The time taken for 50g of the powder to flow through the orifice shall be as follows:

a) For Grade 1 — less than 32 s
b) For Grade 2 — less than 40 s

8.3 COMPRESSIBILITY

8.3.1 Unlubricated powder when pressed with a pressure of 400 N/mm^2 in accordance with IS 4857 shall attain a green density of 7.2 g/cm^3, *Min*.

9 SAMPLING

9.1 The sampling of powders for conducting the various tests shall be done in accordance with IS 6492.

10 PACKING

10.1 The material shall be supplied packed in suitable containers in qualities mutually agreed to between the purchaser and the manufacturer.

11 MARKING

11.1 Each container of copper powder shall be suitably marked with the following information:

a) Copper powder;
b) Bath number and/or date of manufacture of powder;
c) Net mass of powder in the container;
d) Method of manufacture of powder/type of powder; and
e) Manufacturer's name and address.

12 BIS CERTIFICATION MARKING

12.1 The container of copper powder may also be marked with the Standard Mark.

12.2 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standard Act*, 2016 and the Rules and Regulations made thereunder. The details of condition under which the licence for the use of the Standard Mark may be granted to manufacturers or producers, may be obtained from the Bureau of Indian Standards.

13 TEST CERTIFICATE

13.1 The manufacturer shall provide the test certificate for each consignment/ container giving information, such as, batch number, corresponding chemical composition, sieve analysis, apparent density, flow rate, compressibility.

ANNEX A

(*Clause* 6.1.1)

DETERMINATION OF COPPER CONTENT OR COPPER POWDER

A-1 TEST PROCEDURE

A-1.1 Weight approximately 1 g of sample and take it in a 250 ml beaker. Dissolve the sample in 10 ml of nitric of acid specific gravity 1.18 and 36.5 percent (*m*/*m*). Partially cover the beaker with a watch glass and allow the contents to fume on a hot plate. When the fumes stop coming, remove the beaker from hot plate and wash down the watch glass and sides of the beaker with distilled water. Add 3 ml of sulphuric acid of specific gravity 1.84 and 98 percent (*m*/*m*) to the solution and electrolysis copper for a period of 45 min at room temperature at a current strength of 400 A/m^2, and 5-6 V, using an electrode whose mass is pre-weighed correct to 0.1 mg. After 45 min of electrolysis the plated electrode is washed with distilled water in such a manner as to ensure that the wash falls into the beaker containing methylated spirit, taken out and dried with a suitable drier till the mass of the electrode is constant with 0.1 mg. The difference between the masses of electrode prior to plating and after completion of plating divided by the exact weight of sample and multiplied by 100 will give the percentage copper content of the powder.

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This Indian Standard has been developed from Doc No.: MTD 25 (5249).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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Published by BIS, New Delhi